WHAT IS CLAIMED IS:

1. Apparatus for cleaning articles using a caustic solution, comprising:

means for storing the caustic solution;

means for preheating the caustic solution to a first preselected temperature;

means for pressurizing the caustic solution to a first preselected pressure;

a pressure vessel capable of holding the caustic solution and a plurality of articles at a second preselected pressure;

means for introducing the preheated, pressurized caustic solution into the pressure vessel;

means for heating the pressure vessel to a second preselected temperature;

means for removing the caustic solution from the pressure vessel upon completion of the cleaning; and

means for cooling the caustic solution upon removal of the caustic solution from the pressure vessel.

2. Apparatus for removing ceramic coatings from the surfaces of turbine airfoils using an organic caustic solution, comprising:

means for storing the organic caustic solution;

means for preheating the organic caustic solution to a first preselected temperature;

means for pressurizing the organic caustic solution to a first preselected pressure;

a pressure vessel capable of holding the organic caustic solution and a plurality of turbine airfoils at a second preselected pressure;

means for introducing the preheated, pressurized organic caustic solution into the pressure vessel;

means for heating the pressure vessel to a second preselected temperature;

means for removing the organic caustic solution from the pressure vessel upon completion of the ceramic coating removal; and

means for cooling the organic caustic solution upon removal of the organic caustic solution from the pressure vessel.

3. Apparatus for removing ceramic coatings from the surfaces of turbine airfoils using an organic caustic solution, comprising:

a storage tank for the organic caustic solution;

a pre-heater to preheat the organic caustic solution to a first preselected temperature;

a high pressure pump to provide pressurized organic caustic solution at a first preselected pressure to the pre-heater;

an autoclave capable of holding the organic caustic solution and a plurality of turbine airfoils at a second elevated preselected pressure;

a first pipe connecting the pre-heater to the autoclave having a first control valve selectable between providing a variable communication between the pre-heater and the autoclave and isolating the autoclave;

a heating source for heating the autoclave to a second preselected temperature;

a cooler for cooling the organic caustic solution upon removal of the organic caustic solution from the pressure vessel; and

a second pipe connecting the autoclave to the cooler having a second valve selectable between isolating the autoclave and providing communication from the autoclave to the cooler so that the organic caustic solution can be removed from the autoclave upon completion of the ceramic coating removal.

4. The apparatus of claim 3 further including means for filtering the removed ceramic coating from the organic caustic solution.

5. The apparatus of claim 3 wherein the means for filtering includes a mesh screen within the structure surrounding the airfoils to entrap particles of removed ceramic coating.

6. The apparatus of claim 5 wherein the means for filtering is a circulation loop that includes a circulating pump and at least one filter to circulate organic caustic solution from the tank, through the filter to remove ceramic coating particles not entrapped in the mesh screen, and back into the tank.

7. The apparatus of claim 5 wherein the mesh screen has openings sufficient to capture particles having a size of about 1/16 inch and smaller.

8. The apparatus of claim 6 further including analysis equipment for determining the concentration of an organic component and a caustic component of a reusable organic caustic solution that has been utilized for at least one cycle of removing a ceramic coating from a metallic component at elevated temperatures and pressures, the equipment including a sensor positioned in the circulation loop between the filter and the tank to measure a physical property of the organic caustic solution after removal of the particles.

9. The analysis equipment of claim 8 wherein at least two sensors measure at least two physical properties of the organic caustic solution selected from the group consisting of electrical conductivity, opacity, density, refractive index, spectroscopic transmission, fluidity and the speed of sound in the solution.

10. Analysis equipment for determining the concentration of an organic component and a caustic component of a reusable organic caustic solution that has been utilized for at least one cycle of removing a ceramic coating from a metallic component at elevated temperatures and pressures, comprising:

a storage tank for storing the organic caustic solution after removal from the autoclave;

a filter for removing particles from the ceramic coating dispersed in the solution;

a pump for circulating the organic solution from the tank through the filter;

a pipe connecting the tank to the pump, the pump to the filter and the filter to the tank; and

at least two sensors positioned between the filter and the tank to measure at least two physical properties of the organic caustic solution to measure a physical property of the organic caustic solution after removal of the particles selected from the group consisting of electrical conductivity, opacity, refractive index, spectroscopic transmission, density, fluidity and the speed of sound in the solution.

11. The apparatus of claim 8 further including means for metering an amount of filtered organic caustic solution delivered to the autoclave through the high pressure pump and the pre-heater based on a volume of airfoils introduced into the autoclave.

12. The apparatus of claim 11 wherein the means for metering includes a constant volume displacement pump.

13. The apparatus of claim 11 wherein the means for metering includes a tare tank and a load sensor external to the tank for determining a weight of the tare tank after introduction of organic caustic solution.

14. The apparatus of claim 11 wherein the means for metering includes a constant volume displacement pump to pump the organic caustic solution into a tare tank, and a load sensor external to the tank for determining a weight of the tare tank after introduction of organic caustic solution.

15. A valve and pressure sensor control circuit for preventing vaporization of preheated, organic caustic solution:

a variable valve for creating a predetermined back pressure in the pre-heater;

a pressure sensor for sensing the back pressure of the organic caustic solution; and

a controller for controlling the valve responsive to the back pressure sensed by the pressure sensor in order to maintain the back pressure at predetermined levels.

16. The apparatus of claim 11 further including:

a variable valve for creating a predetermined back pressure in the pre-heater positioned between the pre-heater and the autoclave;

a pressure sensor for sensing the back pressure of the organic caustic solution; and

a controller for controlling the valve responsive to the back pressure sensed by the pressure sensor in order to maintain the back pressure at predetermined levels.

17. The apparatus of claim 16 further including means to pre-pressurize the autoclave by injecting a preheated volatile organic fluid into the autoclave prior to introducing the caustic solution into the autoclave.

18. The apparatus of claim 17 wherein the means to pre-pressurize includes:

a volatile organic fluid storage container;

a pump in fluid communication with the storage container;

a line connecting the pump to the pre-heater; and

an isolation valve in the line selectable between providing the volatile organic fluid to the pre-heater and isolating the volatile organic fluid from the pre-heater.

19. The apparatus of claim 18 further including means for recovering the volatile organic fluid from the autoclave.

20. The apparatus of claim 19 wherein the means includes the following:

a line in fluid communication with a head space in the autoclave and the cooler;

an isolation valve in the line selectable between isolating the autoclave from the cooler and providing communications to the cooler;

a line in fluid communication with the cooler and the organic fluid storage container;

an isolation valve in the line selectable between isolating the cooler

from the organic fluid storage container and providing communications from the cooler to the storage tank to permit condensed volatile organic fluid to flow to the storage container.

21. The apparatus of claim 20 wherein the organic fluid storage container is a constant head tank.

22. The apparatus of claim 21 further including a second autoclave for rinsing turbine airfoils at a second preselected temperature and pressure after removal of ceramic coatings using a fluid to neutralize any residual caustic material.

23. Apparatus for recovering a volatile organic from a solution containing a mixture of caustic reagent and volatile organic fluid, comprising:

an autoclave that includes a headspace;

a condenser;

a constant head storage container for the volatile organic fluid;

a storage tank for the solution containing the caustic reagent;

a first line providing fluid communication between the headspace and the condenser;

a first isolation valve selectable between isolating the headspace from the condenser and providing communication between the headspace and the condenser;

a second line in communication between the condenser and the constant head storage container;

a third line in communication between the condenser and the storage tank for the solution containing the caustic;

a second isolation valve selectable between communicating with the second line to direct condensate from the condenser to the constant head storage container while isolating the third line and communicating with the third line to direct condensate from the condenser to the storage tank while isolating the second line;

a fourth line from the constant head storage container to the autoclave,

the line including a pump to provide the volatile organic to the autoclave and a third isolation valve to isolate the autoclave; and

a fifth line from the storage tank to the autoclave, the line including a pump to provide the solution containing the caustic to the autoclave and a fourth isolation valve to isolate the autoclave.

24. A method for removing ceramic coatings from the surfaces of turbine airfoils, comprising the following steps:

placing the airfoils in an autoclave preheated to at least a first preselected temperature; then

providing a preselected volume of volatile organic fluid from a constant head storage container to a pre-heater for preheating the fluid to a second preselected temperature near the first preselected temperature;

introducing the preselected volume of preheated, pre-pressurized volatile fluid from the pre-heater into the autoclave with the airfoils; then

providing a preselected volume of caustic-containing solution from a storage tank to the pre-heater for preheating the caustic solution to a third preselected temperature near the first preselected temperature;

introducing the preselected volume of preheated, pre-pressurized caustic containing solution into the autoclave with the volatile organic fluid and the airfoils;

heating the autoclave to a fourth preselected temperature for a preselected period of time and at a preselected pressure sufficient to remove the ceramic coating from the airfoil surfaces; then

withdrawing a gaseous phase of the volatile organic from the autoclave to a condenser for condensation and cooling;

directing the condensed, cooled volatile organic fluid to the constant head storage container;

pre-filtering large ceramic particles from the caustic containing solution, then while maintaining the autoclave at or above the first preselected temperature, removing the caustic containing solution from the autoclave to

the condenser for cooling;

filtering smaller ceramic particles from the caustic containing solution; and

storing the caustic containing solution in the storage tank.

25. A method for removing material from a plurality of articles, comprising the following steps:

placing the articles in an autoclave preheated to at least a first preselected temperature; then

providing a preselected volume of volatile organic fluid from a constant head storage container to a pre-heater for preheating the fluid to a second preselected temperature near the first preselected temperature;

introducing the preselected volume of preheated, pre-pressurized volatile fluid from the pre-heater into the autoclave with the articles; then

providing a preselected volume of caustic-containing solution from a storage tank to the pre-heater for preheating the caustic solution to a third preselected temperature near the first preselected temperature;

introducing the preselected volume of preheated, pre-pressurized caustic containing solution into the autoclave with the volatile organic fluid and the articles;

heating the autoclave to a fourth preselected temperature for a preselected period of time and at a preselected pressure sufficient to remove material from the articles; then

withdrawing a gaseous phase of the volatile organic from the autoclave to a condenser for condensation and cooling;

directing the condensed, cooled volatile organic fluid to the constant head storage container;

pre-filtering relatively larger particles from the caustic containing solution, then while maintaining the autoclave at or above the first preselected temperature, removing the caustic containing solution from the autoclave to the condenser for cooling;

filtering relatively smaller particles from the caustic containing solution; and

storing the caustic containing solution in the storage tank.